



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/032,562	01/02/2002	Shinichi Imai	740819-729	5821

22204 7590 03/29/2004

NIXON PEABODY, LLP
401 9TH STREET, NW
SUITE 900
WASHINGTON, DC 20004-2128

EXAMINER

RICHARDS, N DREW

ART UNIT	PAPER NUMBER
----------	--------------

2815

DATE MAILED: 03/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/032,562	Applicant(s) IMAI, SHINICHI	
	Examiner N. Drew Richards	Art Unit 2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) 2-9 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2/24/04 has been entered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 is indefinite as one cannot reasonably ascertain the metes and bounds of the limitation "separating an upper portion of the plurality of adjacent contact holes" as recited in lines 18-19. This same limitation is previously recited in lines 12-13 which recite "to separate the plurality of adjacent contact holes." Since separating the contact holes is already claimed in lines 12-13 it is unclear what further limitation is intended by the repeating of the limitation in lines 18-19. Specifically, it is unclear as to whether the "separating" limitation of lines 18-19 is erroneously repeated or, alternatively whether the "separating" limitation of lines 18-19 is intended as a further limitation. If the

Art Unit: 2815

"separating" limitation of lines 18-19 is intended as a further limitation it is unclear as to what the further limitation is intended to entail that is not already claimed in the separation step of lines 12-13.

4. Claim 1 recites the limitation "the unexposed portion" in line 17. There is insufficient antecedent basis for this limitation in the claim.

5. Insofar as definite, the claims are rejected as follows.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Jang (U.S. Patent No. 6,235,633 B1).

Jang disclose in figures 1-6 and on columns 1-8 a method for manufacturing a semiconductor device comprising the steps of:

(a) depositing an interlayer insulator film 20,22 on a substrate 10 including a plurality of conductive layers 14,16,18 (figure 1);

Art Unit: 2815

(b) forming a plurality of contact holes 2 running through the interlayer insulator film 20,22 to reach respective ones of the plurality of conductive layers 14,16,18, each of the contact holes 2 having a tapered portion at an upper end of the interlayer insulating film 20,22 (figure 3, "A" points to the tapered portion at the upper end of the contact holes, tapered portion "A" is formed in layer 22);

(c) depositing a conductive material film 26,28 on the interlayer insulator film 20,22 so as to fill the plurality of contact holes 2 (figure 4);

(d) removing the conductive material film 26,28 until a surface of the interlayer insulator film 20,22 provided between the plurality of adjacent contact holes 2 is exposed so as to separate the plurality of adjacent contact holes 2 and to form a plurality of plugs made of the conductive material film 26,28 filling the plurality of contact holes (figure 5, a first chemical mechanical polishing step is performed that exposes interlayer insulator 22, this step separates the adjacent contact holes and forms a plurality of plugs in the contact holes); and

(e) removing the tapered portions so as to expose the unexposed interlayer insulator film 20 provided between the plurality of adjacent holes 2 in the step (d) and separating an upper portion of the plurality of adjacent contact holes 2 (figure 6, a second chemical mechanical polishing step is performed that removes the tapered portions, thus exposing unexposed layer 20, and separated the upper portion of the contact holes 2, column 5 lines 55-65 disclose this second step removing any metal residue between the plugs to minimize electrical shorts).

Response to Arguments

8. Applicant's arguments filed 2/24/04 have been fully considered but they are not persuasive.

The Examiner notes that the rejections above are new grounds of rejection in response to Applicant's amendment filed 2/24/04. Some of the arguments applicant submitted are moot in view of the new grounds of rejection. However, the examiner will respond to all arguments that are considered relevant to the rejection presented herein.

Applicant argues that Jang separates all the contact holes in a single step (figure 5) and thus does not read on step (d) where "a portion of the surface of the interlayer insulator film between the adjacent contact holes is not exposed and some of the contact holes are not separated." First, it is noted that these limitations are not in the claim as written. Step (d) of claim 1 does not recite a portion of the surface being not exposed nor some of the contact holes not being separated. Thus, Jang does not have to teach either of these limitations to read on the invention as claimed.

Applicant also argues that Jang teaches removing the conductive material until a surface of the interlayer insulator film is exposed and the contact holes are separated but that part of the contact holes are not completely separated. The examiner agrees that Jang teaches removing in this manner and that not all of the contact holes are necessarily separated. However, Jang teaches this in the first chemical mechanical polishing step (figure 5). Jang then teach a second chemical mechanical polishing step (figure 6) which removes the tapered portion (removes layer 22) to completely separate the contact holes and remove any metal residue between the metal plugs (column 5

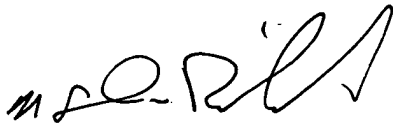
Art Unit: 2815

lines 59-62). Thus, Jang does teach separating all the contact holes and discloses doing so in a manner as claimed in the instant application, by removing the conductive material (figure 5) and then removing the tapered portions (figure 6).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to N. Drew Richards whose telephone number is (571) 272-1736. The examiner can normally be reached on M-F 8:00-5:30; Every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


NDR


GEORGE ECKERT
PRIMARY EXAMINER